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Chapter 8 Earthquakes and Earth's Interior

Section 8.1 What Is an Earthquake?

This section explains what earthquakes and faults are and what causes earthquakes.

Reading Strategy

Building Vocabulary As you read this section, write a definition for each vocabulary term in your own words. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Vocabulary	Definition
earthquake	a. Vibrations throughout (E) caused by rapid energy release
fault	b. Fracture in lithosphere (crust) where movement has occurred
focus	c. location w/in (E) where earthquake originates
epicenter	d. Surface location directly above where Earthquake originates

1. Circle the letter of the approximate number of major earthquakes that take place each year.

a. about 50 b. about 75
c. about 3000 d. about 30,000

Earthquakes

Match each description with its earthquake feature.

Description	Earthquake Feature
<u>e</u> 2. Earth vibration caused by rapid energy release	a. epicenter
<u>c</u> 3. energy that radiates in all directions from the earthquake origin	b. focus
<u>d</u> 4. fracture where movement has occurred	c. seismic wave
<u>a</u> 5. surface location directly above where an earthquake originates	d. fault
<u>b</u> 6. location within Earth where an earthquake originates	e. earthquake

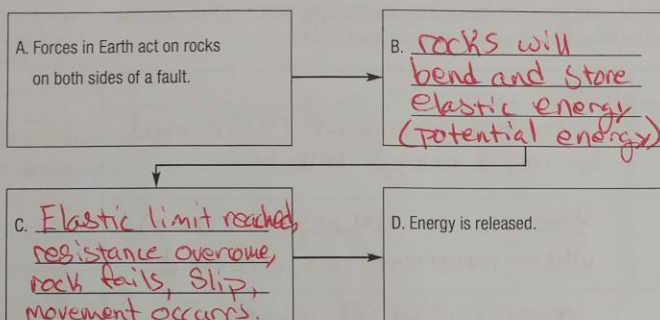
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The Cause of Earthquakes

7. Is the following sentence true or false? It was not until after the 1906 San Francisco earthquake was studied that the actual cause of earthquakes was understood. True

8. Complete the flowchart to show the sequence of events that occur when rocks are deformed along a fault.



9. The elastic rebound hypothesis states that when rocks are deformed, they bend and then break, releasing stored energy.
10. What causes most earthquakes? rapid release of energy as rock/plate movement occurs along faults
11. Is the following sentence true or false? Most earthquakes occur along existing faults. True
12. Circle the letter of small Earth movements that occur following a major earthquake.
- a. foreshocks
 - b. slippage
 - ☒ c. aftershocks
 - d. foci
13. The San Andreas is one of the most studied fault systems in the world.
14. What is fault creep? slow, smooth, gradual movement along faults

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Section 8.2 Measuring Earthquakes

This section discusses types of seismic waves and how earthquakes are located and measured.

Reading Strategy

Outlining As you read, fill in the outline with the important ideas in this section. Use the green headings as the main topics and the blue headings as subtopics. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook

Measuring Earthquakes	
I. Seismic Waves	
A. Body Waves	
B. _____	
C. _____	
II. _____	
A. _____	
B. _____	
III. _____	
A. _____	
B. _____	
C. _____	
IV. _____	

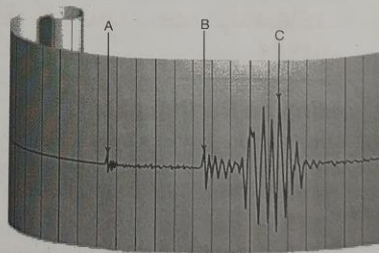
Recording Seismic Waves

1. Circle the letter of the type of seismic wave that shakes particles at right angles to their direction of travel.

- a. P waves
- b. S waves
- c. surface waves
- d. compression waves

2. The figure shows a typical recording of an earthquake. Select the appropriate letter in the figure that identifies each of the following types of seismic waves.

- C surface wave
- B S wave
- A P wave



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3. Ⓐ Circle the letter of the name of the recording of the three types of seismic waves in the figure on page 57.

- a. seismograph
- b. seismogram
- c. seismic wave
- d. travel-time graph

Measuring Earthquakes

4. Ⓐ What two types of measurements do scientists use to describe the size of earthquakes? magnitude & intensity

Match each description with its term related to earthquake measurement.

Description	Term
<u>d</u> 5. derived from the amount of displacement that occurs along a fault zone	a. intensity b. magnitude c. Richter scale d. moment magnitude scale
<u>C</u> 6. based on the amplitude of the largest seismic wave recorded on a seismogram	
<u>b</u> 7. Ⓐ measure of the size of seismic waves or amount of energy released at the earthquake source	
<u>a</u> 8. Ⓐ measure of the amount of earthquake shaking at a location based on damage	

9. Ⓐ What measurement do scientists today use for earthquakes?

moment [magnitude] scale

10. Ⓐ Why is the answer to question 9 the most widely used measurement for earthquakes?

unbiased, estimation of total energy released, not biased by location relative to quake

Locating an Earthquake

11. Is the following sentence true or false? On a seismogram, the greater the interval is between the arrival of the first P wave and the first S wave, the greater the distance to the earthquake source.

True

12. Ⓐ Is the following sentence true or false? You can use travel-time graphs from two seismographs to find the exact location of an earthquake epicenter.

False

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Section 8.3 Earthquake Hazards

This section discusses damage caused by earthquakes and explains how earthquakes are predicted.

Reading Strategy

Monitoring Your Understanding Preview the Key Concepts, topic headings, vocabulary, and figures in this section. List two things you expect to learn. After reading, state what you learned about each item you listed. For more information on this Reading Strategy, see the Reading and Study Skills in the Skills and Reference Handbook at the end of your textbook.

What I Expect to Learn	What I Learned
a.	b.
c.	d.

Causes of Earthquake Damage

1. What risk does liquefaction pose during an earthquake?
stable solid turns into liquid, heavy structures sink, pipes underground may rise up
2. Is the following sentence true or false? Most earthquakes generate tsunamis. False *caption Fig. 10
3. The sinking of the ground caused by earthquake vibrations is called ground liquefaction.
4. During an earthquake, violent shaking can cause soil and rock on slopes to move, resulting in land slides/mud slides.

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5. Complete the table about tsunamis.

Tsunamis		
Definition	Causes	Areas Protected from Tsunamis by Warning System
A wave formed when the ocean floor shifts suddenly during an earthquake. Entire water column!	a. ocean floor slab displacement b. underwater landslide or volcanic eruption	Indian & Atlantic oceans, now all coastal regions in all oceans

Reducing Earthquake Damage

6. List three factors that affect the degree of damage that occurs to structures as a result of earthquakes.

Duration of seismic shaking, building material, distance to epicenter, ground type

7. Circle the letter of the structure that is least likely to be damaged in a major earthquake.

- ☒ a. reinforced steel-frame building
- b. nonflexible wood-frame building
- c. unreinforced stone building
- d. unreinforced brick building

8. Is the following sentence true or false? Methods used to make short-range earthquake predictions have not been successful.

True

9. Is the following sentence true or false? Scientists are able to make accurate long-term earthquake predictions based on their understanding of how earthquakes occur.

True

10. What do scientists call an area along a fault where no earthquake activity has occurred for a long time?

Seismic gap

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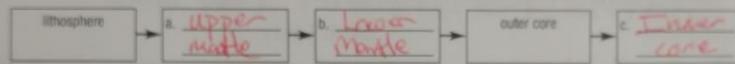
This section describes Earth's layers and their composition.

8.4

Reading Strategy

Sequencing After you read, complete the sequence of layers in Earth's interior. For more information on this Reading Strategy, see the Reading and Study Skills in the Skills and Reference Handbook at the end of your textbook.

Earth's Internal Structure



Layers Defined by Composition

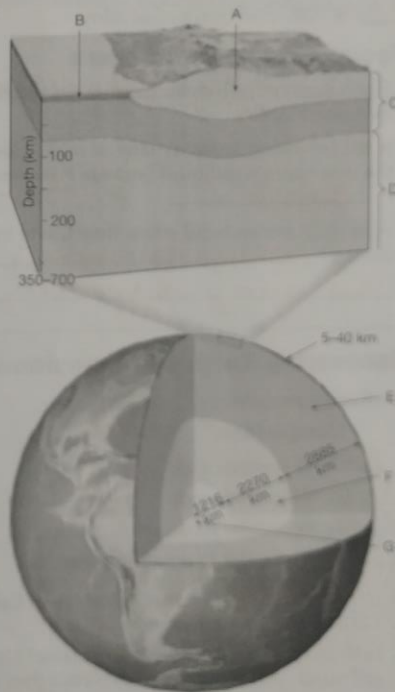
1. Use the figure of Earth's structure to write the letter(s) that represents each of the following layers.

mantle E

continental crust A

oceanic crust B

core F, G



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Layers Defined by Physical Properties

2. Use the figure of Earth's structure on the previous page to write the letter that represents each of the following layers.

inner core G
asthenosphere D
outer core F
lithosphere C

Match each description with its Earth layer.

Description	Earth Layer
<u>a</u> 3. soft, weak rock near its melting point	a. asthenosphere
<u>c</u> 4. liquid iron-nickel alloy that generates Earth's magnetic field	b. inner core
<u>d</u> 5. cool, rigid crust and uppermost mantle	c. outer core
<u>b</u> 6. solid iron-nickel alloy	d. lithosphere

Discovering Earth's Layers

7. The boundary called the Mohorovičić Discontinuity or Moho separates the crust from the mantle.

8. Is the following sentence true or false? Geologists concluded that the outer core was liquid because P waves could not travel through it. False

9. Why do P waves bend when they travel into the outer core from the mantle? Change in physical properties of material the energy is traveling through

Discovering Earth's Composition

Match each composition with its Earth layer.

Composition	Earth Layer
<u>b</u> 10. basaltic rock	a. continental crust
<u>a</u> 11. granitic rock	b. oceanic crust
<u>d</u> 12. similar to stony meteorites	c. core
<u>c</u> 13. similar to metallic meteorites	d. mantle

14. Meteorites that collide with Earth provide evidence of Earth's inner composition.

15. Is the following sentence true or false? Until the late 1960s, scientists had only seismic evidence they could use to determine the composition of oceanic crust. True